

23 March 2018

Ms. Nancy Rumrill
U.S. Environmental Protection Agency
Region 9, Ground Water Office, WTR-9
75 Hawthorne Street
San Francisco, California 94105-3901

**Re: Notification of Intent and Scope of Planned Formation Testing for the PTF Area
UIC Permit No. R9UIC-AZ3-FY11-1
Florence Copper Project, Florence Arizona**

Dear Ms. Rumrill:

Florence Copper Inc. (Florence Copper) herewith conveys notice of intent to conduct pre-operational formation testing at the Proposed Test Facility (PTF) at the Florence Copper Project Site (Site). This notification is provided in accordance with the terms of Underground Injection Control (UIC) Permit R9UIC-AZ3-FY11-1 (Permit) which requires Florence Copper to provide the U.S. Environmental Protection Agency (EPA) the proposed formation testing procedures for review and approval in accordance with Part II.A.2 of the Permit. The formation testing scope of work is provided below.

The pre-operational formation testing includes pumping, recovery, and tracer tests proposed to be completed in four stages. Each of the pre-operational testing stages are summarized below.

Formation Testing

STAGE 1 – Test Preparations

Stage 1 activities will include the following:

- Review and evaluate well development records for each of the wells to be used in the pre-operational tests to confirm the pumping/injection rates for the planned aquifer tests described below;
- Prepare testing equipment including; pumps, flow meters, barometer, transducers, discharge piping, and other necessary equipment; and
- Make preparations for disposal of excess water produced during testing.

STAGE 2 – Pump Testing at Four Outermost Recovery Wells (Required by APP 106360)

Conduct four separate step-rate pumping tests at wells R-01, R-03, R-05, and R-07. The tests will be designed to meet the requirements of the Aquifer Protection Permit (APP) P-106360. The pumping and observation wells used in each of the four test groups are shown in Table 1.

Table 1. Stage 2 Pumping Test Groups

Group	Pumping Well	Observation Wells
1	R-01	O-07, O-01, I-01
2	R-03	O-02, O-03, I-02
3	R-05	O-04, I-03
4	R-07	O-05, O-06, I-04

Pumping tests will be conducted at each of the pumping/observation well groups listed in Table 1. The procedure for conducting the Stage 2 tests includes the following steps:

Test Set Up

- a) Install a barologger on Site to record barometric pressure prior to and during testing.
- b) Install flow profiling tool. Geophysical contractor will install the flow profiling tool into the well screen prior to installing the pump.
- c) Install test pump. The pump intake will be installed to an approximate depth of 490 feet below ground surface (bgs).
- d) Install pressure transducers equipped with data loggers in each of the above wells 2 days before the start of testing with a minimum data collection interval of 12 readings per hour. The data collected at these wells will serve as ambient background and reference water elevations for Stage 2 pumping tests.
- e) Collect depth to water measurements at wells M-54O, M54-LBF, M54-LBF, M54-O, M55-UBF, M56-LBF, MW-01 LBF, and MW-01-O.
- f) Conduct manual water level measurements for all wells in the active test group and install pressure transducers equipped with data loggers in the pumping and observation wells at least 24 hours prior to the start of the step-rate test, to measure the pre-test water elevation trends. The minimum data collection interval will be one reading per minute.
- g) On testing day, measure depth to water by hand for all wells in the active test group prior to the start of pumping.
- h) Prior to testing, collect manual depth to water measurements, install and program transducers in the wells of the next test group.

Conduct Testing

- a) Commence pumping as follows:
 - (i) Step 1 (0 to 30 minutes): 5 gallons per minute (gpm)
 - One round of manual measurements of the group wells will be collected and field parameters will be measured prior to increasing the pumping rate.
 - (ii) Step 2 (30 to 60 minutes): 10 gpm
 - One round of manual measurements of the group wells will be collected and field parameters will be measured prior to increasing the pumping rate.
 - (iii) Step 3 (60 to 90 minutes): 20 gpm
 - One round of manual measurements of the group wells will be collected and field parameters will be measured prior to increasing the pumping rate.
 - (iv) Step 4 (90 to 240 minutes): 40 gpm
 - One round of manual measurements of the group wells will be collected and field parameters will be measured prior to increasing the pumping rate; and
 - A spinner flowmeter survey will be conducted approximately 10 minutes after the start of this pumping step, the step will be extended if necessary to accommodate the flowmeter survey.

- (v) Stop pumping, manually measure depth to water every 30 minutes for 1.5 hours and continue data collection with the pressure transducers equipped with data loggers overnight (minimum 10 hours of recovery).
 - (vi) Collect final water head measurements and retrieve the data loggers.
 - (vii) Remove the pump and move to the next group.
- b) Conduct the subsequent three tests according to steps outlined above.

STAGE 3 –Formation Testing, Upper Basin Fill and Lower Basin Fill Units

Stage 3 activities will be conducted to confirm existing aquifer parameters in the Upper Basin Fill and Lower Basin Fill Units. Stage 3 testing includes the following steps:

Test Set Up

- a) Install a barologger on Site to record barometric pressure prior to and during testing.
- b) Install test pump. The pump intake will be installed to a depth approximately 10 feet above the screen in each well.
- c) Install pressure transducers equipped with data loggers in each of the pumping and observation wells 2 days before the start of testing with a minimum data collection interval of 12 readings per hour. The data collected at these wells will serve as ambient background and reference water elevations for Stage 3 pumping tests.
- d) Collect depth to water measurements at wells M55-UBF, M56-LBF, O-7, and O-6;
- e) On testing day, measure depth to water by hand for both pumping and observation wells prior to the start of pumping.

Conduct Testing

- a) Pump each well for a period of 3 hours at a constant pumping rate between 10 and 20 gpm depending on well development records. A separate test will be conducted, on separate days for each of the wells to be tested (M55-UBF and M56-LBF).
- b) Pressure transducers equipped with data loggers deployed in wells M55-UBF, M56-LBF, O-7, and O-6 and will have a minimum data collection interval of one reading per minute.
- c) Manual water measurements will be collected before each test and every 15 minutes at the pumped well during the test duration.
- d) Field parameters will be measured before the end of each test.
- e) After each 3-hour constant rate test, water levels will be allowed to recover overnight.

STAGE 4 – Tracer Testing

Stage 4 will consist of a tracer injection test as required in Part II.C.8 of the UIC Permit. The tracer test will actively use all four injection wells as tracer injection points and the Center Recovery well R-09 at the center of the PTF field to extract groundwater and tracer. The outer recovery wells (R-01 through R-08) will be used as water level observation points, and the advancement of the tracer from the injection wells will be monitored using the multi-port Westbay® wells.

The planned rate of injection for each injection well will be approximately 25 gpm and the extraction rate for the recovery well will be 100 gpm. The primary monitoring wells will be the four Westbay® wells located between the four injection wells and the recovery well.

Rhodamine and/or Fluorescein will be used as the tracer dye. Approximately 3 to 5 pounds of the dye will be diluted and metered into the injection wells over a period of 24 hours. A portable fluorometer will be used to collect the tracer breakthrough data.

Based on data collected in the Oxide Bedrock formation the time required to complete the test will be approximately 14 days. The tracer testing will include the following steps:

- a) Piping will be installed in each of the injection wells to inject the tracer into the screened interval.
- b) A pump capable of pumping 100 gpm will be set in the Center Recovery well R-09 at an approximate depth of 500 feet bgs.
- c) A metering pump will be installed on the discharge line from the R-09 pump capable of metering at an appropriate rate.
- d) The metered flow will be distributed through a manifold into each injection well, with a valve installed to control the flow into each injection well.
- e) Install pressure transducers equipped with data loggers into each of the Recovery Wells and Injection Wells.
- f) Begin extraction and injection
 - i. During the initial 24-hour period, meter the tracer into each injection well to achieve the planned concentration in each injection well.
- g) During testing, the following data will be collected:
 - i. Daily groundwater sampling (tracer compound) and water level measurements at all ports of the Westbay® wells;
 - ii. Daily sampling of extracted groundwater from sampling ports on the above-ground recirculation line before and after the tracer addition point; and
 - iii. Pressure, flow in each discharge and injection line, and other applicable instrument readings hourly.
- h) The test will be terminated 24 hours after the tracer compound has been detected at a minimum of one port in each of the four Westbay® wells.
- i) Testing equipment will be removed from the wells and they will be equipped with the permanent pumping and injection equipment.

DATA ANALYSIS

The aquifer testing results will be analyzed using the program, AQTESOLV (<http://www.aqtesolv.com/>). The pumping rate and observed drawdown data will be analyzed using an appropriate analytical solution (e.g., Theis [confined conditions], Hantush-Jacob [leaky conditions], and Moench [fractured media]) to characterize the hydraulic properties of the tested aquifer zones. The ability of a recovery well to induce sufficient drawdowns at observation wells will also be evaluated. The observed tracer travel times from injection wells to various ports of the Westbay® wells will be used to assess the extent of horizontal and

vertical heterogeneity of the tested aquifer. As required by Part II.G.4 of the UIC Permit and Section 2.7.4.3 of the APP, the hydraulic properties of the aquifer developed during this testing evaluation will be compared to the site groundwater flow model parameters and summarized in the formation testing report required by the UIC and in the Aquifer Pump Testing Report required by the APP.

Please contact me at 520-374-3984 if you require any additional information.

Sincerely,
Florence Copper Inc.



Daniel Johnson
Vice President – General Manager

cc: Audrey Johnson, U.S. Environmental Protection Agency
Maribeth Greenslade, Arizona Department of Environmental Quality